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BIOLOGICAL SURVEY OF ROCK CREEK FROM ROCKVILLE, MARYLAND TO THE POTOMAC RIVER

Federal Water Pollution Control Administration
Charlottesville, Virginia

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BIOLOGICAL SURVEY

OF

ROCK CREEK

From Rockville, Maryland

to

The Potomac River

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LaBoy
FWPCA
Middle Atlantic Region
October 1966

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I. INTRODUCTION

A biological survey of Rock Creek, a tributary of the Potomac River, was conducted in August 1966. The survey was made to determine the biological condition of the stream from north of Rockville, Maryland, to the mouth of the stream in Washington, D. C. (See Figure 1, following page 14.)

For purposes of the study, the community of bottom (benthic) organisms was selected as the indicator of the biological condition of the stream. Bottom organisms serve as the preferred food source for the higher aquatic forms and exhibit similar reactions to adverse stream conditions. The combination of limited locomotion and life cycles of one year or more, for most benthic species, provide a long-term picture of the water quality of a stream. Fish and algal populations were given some consideration, but only to the extent that obvious conclusions could be drawn based upon casual observations.

In unpolluted streams, a wide variety of sensitive clean-water associated bottom organisms are normally found. Typical groups are stoneflies, mayflies, and caddisflies. These sensitive organisms usually are not individually abundant because of natural predation and competition for food and space; however, the total count or number of organisms at a given station may be high because of the number of different varieties present.

Sensitive genera tend to be eliminated by adverse environmental conditions (e.g., chemical and/or physical) resulting from wastes

reaching the stream. In waters enriched with organic wastes, comparatively fewer kinds (genera) are normally found, but great numbers of these genera may be present. Organic pollution-tolerant forms such as sludgeworms, rattailed maggots, certain species of bloodworms (red midges), certain leeches, and some species of air-breathing snails may multiply and become abundant because of a favorable habitat and food supply. These organic pollution-tolerant bottom organisms may also exist in the natural environment but are generally found in small numbers. The abundance of these forms in streams heavily polluted with organics is due to their physiological and morphological abilities to survive environmental conditions more adverse than conditions that may be tolerated by other organisms. Under conditions where inert silts or organic sludges blanket the stream bottom, the natural home of bottom organisms is destroyed, causing a reduction in the number of kinds of organisms present.

In addition to sensitive and pollution-tolerant forms, some bottom organisms may be termed intermediates, in that they are capable of living in fairly heavily polluted areas as well as in clean-water situations. These organisms occurring in limited numbers, therefore, cannot serve as effective indicators of water quality.

II. SUMMARY AND CONCLUSIONS

1. A biological survey of Rock Creek and tributaries from north of Rockville, Maryland, to the Potomac River in Washington, D. C., was conducted in August 1966. Investigations were made at 16 stations on Rock Creek and at four stations on tributaries.

2. Bottom organisms were selected as the primary indicator of biological water quality.

3. From Avery, Maryland, to the small tributary east of Rockville, Maryland, an abundance of minnows and clean-water bottom organisms indicated good water quality. From the tributary to Viers Mill Village, some degradation of water quality was noted, but indicated water quality was generally good.

4. Trash and degraded aquatic life were observed at Viers Mill Village, indicating fair water quality.

5. Improved aquatic life, indicating good water quality, was found from Garret Park, Maryland, to North Chevy Chase, Maryland.

6. Evidence of pollution increased as the Rock Creek Survey continued downstream to the Potomac. Coquelin Creek contributed nitrogen and phosphorus, and Piney Branch contributed a mild organic pollution load to the stream. Sparse clean-water genera at Rock Creek Recreation Center indicated fair water quality, while intermediate and pollution-tolerant genera in the reach from Beach Drive to P Street indicated mild pollution.

7. Slash Run and P Street outfall sewers were contributing organic pollution to Rock Creek. Moderate to heavy pollution was indicated from P Street to the Potomac River. Dominant bottom organisms consisted of intermediate and pollution-tolerant genera. Only one bottom organism was found at the mouth of Rock Creek. Tidal action diffuses salt water into the mouth of the stream, which probably accounted for the low population of bottom organisms in the area.

III. DATA EVALUATION AND INTERPRETATION

Rock Creek is a small, scenic stream flowing southeast from north of Rockville in Montgomery County, Maryland, and discharging into the Potomac River in Washington, D. C. Bridle paths, picnic and recreation areas, and the National Zoological Park are among the facilities along the banks of the stream.

Storm sewers discharge into the stream at various points, but no sanitary or industrial sewers discharge directly into the stream upstream from P Street in Washington, D. C.

Sampling stations were located after consideration of the following conditions:

1. Tributaries
2. Areas having a known waste problem
3. Physical capability for sampling.

Bottom organisms are animals that live directly in association with the bottom of a waterway. They may crawl on, burrow in, or attach themselves to the bottom. Macroorganisms are usually defined as those organisms that will be retained by a No. 30 sieve. In essence, the organisms retained by the sieve are those that are visible to the unaided eye.

Each station was sampled once, and the kinds of macro bottom organisms were observed for the purpose of evaluating water quality. Quantitative bottom samples were also taken, using a Surber Square Foot Sampler, and the number of organisms per square foot was counted.

Quantitative samples were not taken at stations in non-critical areas or where organisms were very sparse.

Discussions of stations proceed downstream unless otherwise noted.

Station #1 - Rock Creek at Avery Road Bridge north of Rockville, Maryland

The water at this station was clear, and numerous minnows were observed throughout the area. A total of nine genera of bottom organisms were found, including such clean-water forms as mayflies (two genera), caddisflies, and fishflies. Good water quality was indicated based on the bottom organisms.

Station #2 - Rock Creek, East Branch at Route 115 Bridge, north of Rockville, Maryland

Very clear water and numerous minnows were observed in this area. A total of 17 different genera of bottom organisms were collected and included such clean-water forms as stoneflies, mayflies (three genera), caddisflies (two genera), fishflies, and riffle beetles. A total of 109 bottom organisms were collected in the square foot sample, which included 35 caddisflies, 20 mayflies, 15 riffle beetles, and four fishflies. Excellent water quality was indicated.

Station #3 - Rock Creek tributary at Avery Road, east of Rockville, Maryland

A sparse population of four genera of bottom organisms was found in this tributary, mayflies and caddisflies being the dominant organisms. Fair water quality was indicated.

Station #4 - Rock Creek at Route 28 Bridge, East of Rockville, Maryland

A total of 16 genera of bottom organisms were sampled at this station and included such clean-water forms as mayflies, caddisflies (two genera), fishflies, and riffle beetles. The water was somewhat murky, but small schools of minnows could be observed. Only 35 bottom organisms were collected in the square foot sample, with fingernail clams (an intermediate) being the dominant form with 15 in number. Good water quality was indicated.

Station #5 - Rock Creek upstream from Randolph Road at Viers Mill Village, Maryland

Cloudy water, abundant trash, and sparse bottom organisms were noted at this station. Only one clean-water caddisfly was among the four bottom organisms found; the balance consisted of two intermediate genera and a pollution-tolerant form. Fair water quality was indicated.

Station #6 - Rock Creek at Route 547 Bridge, Garrett Park, Maryland

The water was clear, and small schools of minnows were observed at this station. Bottom organisms were not abundant, and only five genera were sampled. The sample, however, included such clean-water forms as mayflies (two genera) and caddisflies. Good water quality was indicated.

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Station #7 - Rock Creek at Beach Drive and Cedar Lane, Kensington, Maryland

Exceptionally clear water, numerous minnows, and ten different genera of bottom organisms were found at this station. Included in the sample were such clean-water forms as mayflies (two genera) and caddisflies (two genera). A total of 224 bottom organisms were collected in the square foot sample, which included 27 mayflies and three caddisflies. The dominant form was an intermediate midge larva which made up 190 of the total count. Good water quality was indicated.

Station #8 - Rock Creek at Jones Mill Road, Chevy Chase, Maryland

At this station the water was again exceptionally clear, and numerous small minnows were observed. Only three genera of bottom organisms were found, but they consisted mainly of two genera of caddisfly larvae. Good water quality was indicated.

Station #9 - Coquelin Creek at Jones Mill Road Bridge, North Chevy Chase, Maryland

On this small tributary to Rock Creek, the water was clear, but the filamentous algae was heavy in much of the area, suggesting excessive nitrogen and phosphorus. Oil slicks arose when some of the bottom was stirred up by wading. A total of 12 genera of bottom organisms was found and included a fair population of mayflies and caddisflies. Blackflies were the dominant organism and made up 155 of the 192 organisms in the square foot sample. Only fair water quality was indicated.

Station #10 - Rock Creek at East-West Highway 410, Rock Creek Recreation Center, Maryland

Clear water and minnows were observed in this area. A total of ten genera was found, but bottom organisms were generally sparse. A small population of mayflies, consisting of only 23 organisms, was collected in the square foot sample. Fair water quality was indicated.

Station #11 - Rock Creek at Wise Road and West Beach Drive, Washington, D. C.

Only three genera of bottom organisms, consisting of two pollution-tolerant genera and one intermediate genera, were sampled at this station. Bottom organisms were sparse, and a quantitative sample was not taken. About 20 yards downstream, a large storm sewer empties from the left bank (facing downstream). The bottom in this channel appeared to be coated with oil, and oil slicks came to the surface when the bottom was disturbed. Mild pollution is suggested in this area.

Station #12 - Rock Creek at Military Road, Washington, D. C.

This station was located at a roadside park. Five genera of bottom organisms were found, consisting of three organic pollution-tolerant genera and two intermediate forms. Generally, bottom organisms were sparse. A small tributary comes in from the left bank a short distance downstream. This tributary was very heavy with filamentous algae, suggesting high nitrogen and phosphorus. Mild organic pollution is suggested.

Station #13 - Rock Creek at Park Road Bridge, Washington, D. C.

The water was clear, and small schools of minnows were observed in the area. Eight genera of bottom organisms were sampled, consisting of four organic pollution-tolerant and four intermediate forms. Bottom organisms were not abundant; only 27 were collected in the square foot sample. Mild organic pollution is suggested.

Station #14 - Piney Branch at Park Road Bridge, Washington, D. C.

In this tributary to Rock Creek, the water was clear, but filamentous algae was extremely abundant on the rocks and gravel. Nine genera were collected, but the sample contained only one clean-water associated form (mayfly). The balance consisted of four intermediate forms and four pollution-tolerant forms. The dominant form was an intermediate midge larva, which made up 75 of the 113 bottom organisms in the square foot sample. A faint sewage odor was detected. In addition, heavy algae suggested high nitrogen and phosphorus concentrations. Piney Branch is believed to contribute a mild pollutional load to Rock Creek.

Station #15 - Rock Creek at Harvard Street Entrance to the National Zoological Park, Washington, D. C.

In this area the water was clear, but the rocks were coated with slime. Although nine genera of bottom organisms were found, only fair populations of an intermediate midge larva and a pollution-tolerant snail were sampled. The other bottom organisms were sparse.

The intermediate midge larva made up 86 of the 103 bottom organisms in the square foot sample. Mild organic pollution is suggested.

Station #16 - Rock Creek at Calvert Street Bridge, Washington, D. C.

Clear water and numerous minnows were observed at this station; however, a faint sewage odor was detected. Although ten genera of bottom organisms were found, the only clean-water associated form consisted of a few caddisfly larvae. An intermediate midge larva made up 46 of the 55 organisms collected in the square foot sample. Sludgeworms, the bloodworm midge Chironomus, blackflies, and two genera of pollution-tolerant snails were collected. Mild organic pollution was indicated.

Station #17 - Rock Creek upstream from P Street Outfall, Washington, D. C.

Rock Creek was sampled immediately upstream from the P Street outfall. The water was clear, and small schools of minnows and sunfish were observed upstream but not downstream from the outfall. Broken glass and trash were heavy in the stream. Six genera of bottom organisms were collected, consisting of four organic pollution-tolerant forms and two intermediate forms. The dominant forms were an intermediate midge (98) and sludgeworms (43) out of the 158 bottom organisms collected in the square foot sample. Mild organic pollution was indicated.

Station #18 - Rock Creek downstream from P Street Outfall, Washington, D. C.

This station was located approximately 25 yards downstream from the P Street outfall in Washington, D. C. A faint sewage odor was detected, and trash was observed in the stream. Only five genera of bottom organisms were found, and these consisted of four organic pollution-tolerant forms and one intermediate kind. The pollution-tolerant genera consisted of bloodworms, sludgeworms, leeches, and a pollution-tolerant snail. Moderate organic pollution was indicated.

Station #19 - Rock Creek at Slash Run Outfall, Washington, D. C.

Rock Creek was sampled downstream from the Slash Run outfall, which is downstream from the P Street outfall in Washington, D. C. The water was murky, and the sewage odor was strong. The bottom organisms consisted of three pollution-tolerant genera and two intermediate genera. The 480 organisms in the square foot sample included 390 intermediate midges and 71 sludgeworms. Moderate organic pollution is indicated at this station. The source appears to be the Slash Run sewer.

Station #20 - Rock Creek at the Potomac River, Washington, D. C.

The last station on Rock Creek was located approximately 30 yards upstream from the mouth, near the canoe rental concession. The water was very turbid, and oil slicks were stirred up by wading. After approximately 15 minutes of intensive searching, only one bloodworm could be found. A quantitative sample was not taken for this reason. Tidal action washes trash and waste into the area.

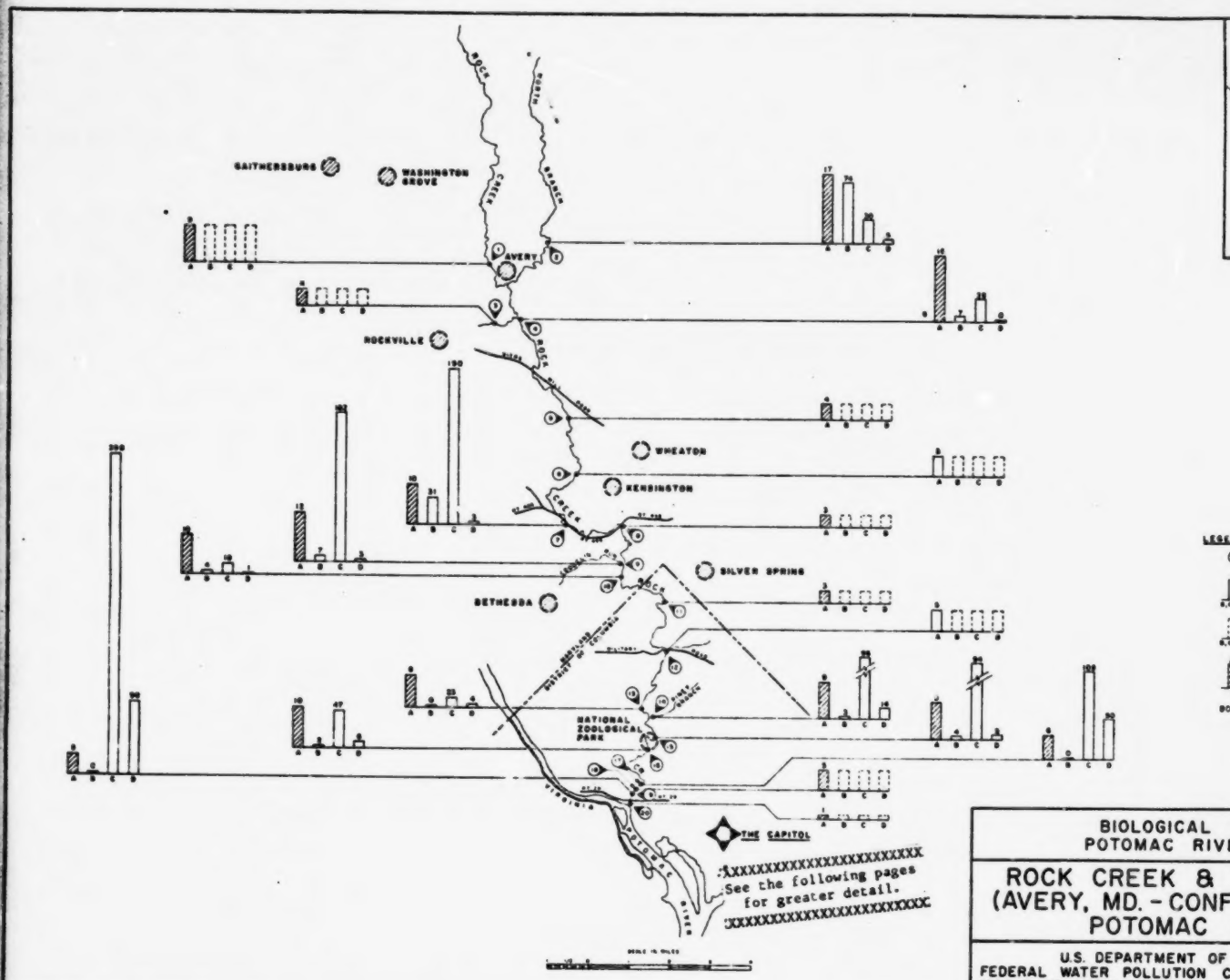
TABLE I

BOTTOM ORGANISM DATA OF
ROCK CREEK AND TRIBUTARIES

Station Number	Location	Bottom Organisms		Dominant Forms	Indicated Water Quality
		No. of Kinds	No. Per Sq. Ft.		
1	Avery Road Bridge, Maryland	9	Not Taken	Mayflies Caddisflies	Good
2	Route 115 Bridge, Rock Creek North Branch, Maryland	17	109	Caddisflies Mayflies	Excellent
3	Tributary at Avery Road, Maryland	4	Not Taken	Mayflies Caddisflies	Fair
4	Route 28 Bridge, Maryland	16	35	Fingernail Clams	Good
5	Randolph Road, Viers Mill Village, Maryland	4	Not Taken	Intermediate Genera	Fair
6	Route 547 Bridge, Maryland	5	Not Taken	Mayflies Caddisflies	Good
7	Beach Drive and Cedar Lane, Maryland	10	224	Midge Larva Mayflies Caddisflies	Good
8	Route 495 and Jones Mill Road, Maryland	3	Not Taken	Caddisflies	Good
9	Coquelin Creek at Jones Mill Road Bridge, Maryland	12	192	Blackflies	Fair
10	Route 410 at Rock Creek Recreation Center, Maryland	10	23	Intermediate Genera	Fair
11	Wise Road and West Beach Drive, Washington, D. C.	3	Not Taken	Pollution-Tolerant Genera	Mildly Polluted

TABLE I (Continued)

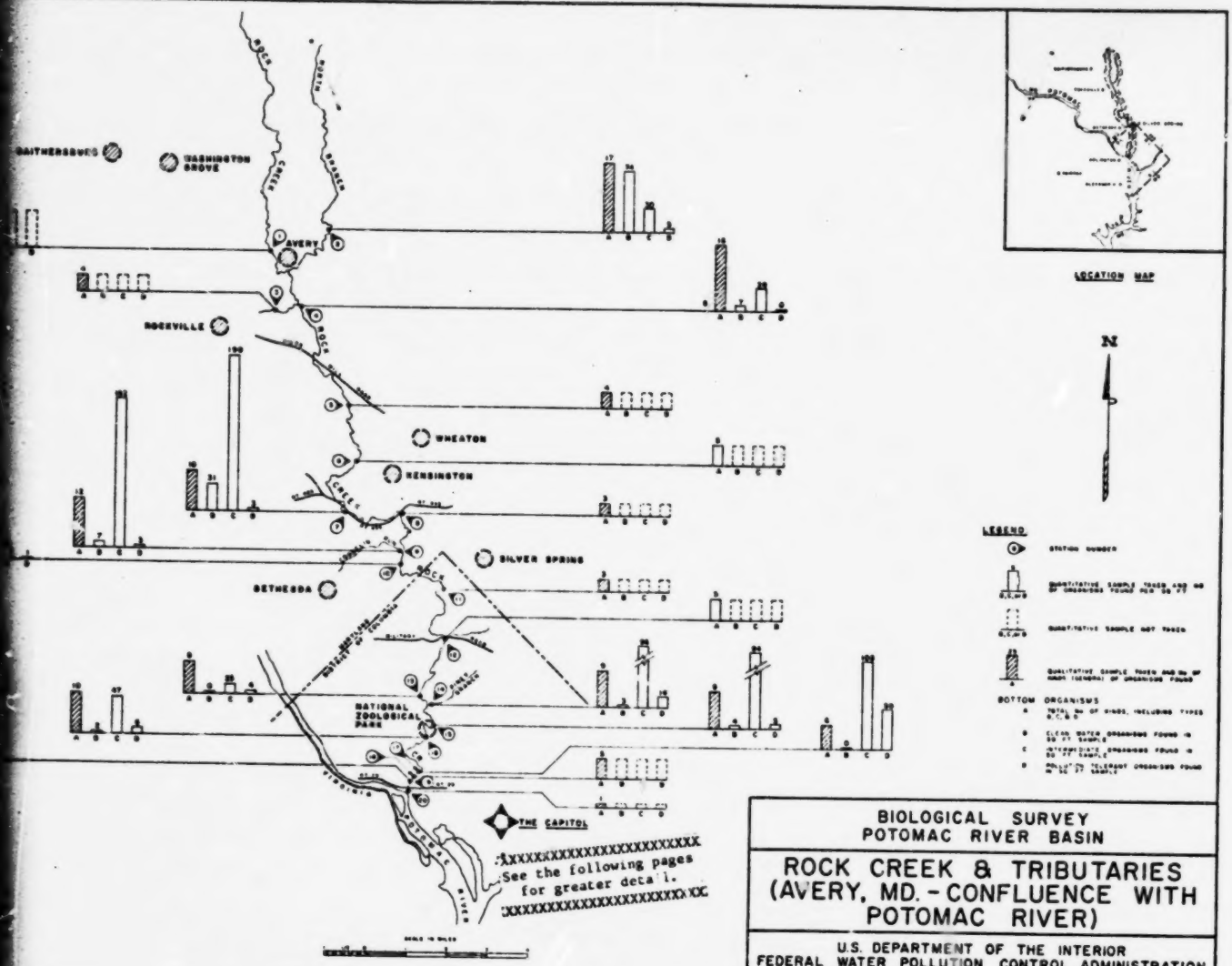
Station Number	Location	Bottom Organisms: No. of Kinds	Bottom Organisms: No. Per Sq. Ft.	Dominant Forms	Indicated Water Quality
12	Military Road, Washington, D. C.	5	Not Taken	Pollution-Tolerant Genera	Mildly Polluted
13	Park Road Bridge, Washington, D. C.	8	27	Intermediate and Pollution-Tolerant Genera	Mildly Polluted
14	Piney Branch at Park Road Bridge, Washington, D. C.	9	113	Midge Larva Pollution-Tolerant Genera	Mildly Polluted
15	National Zoo, Harvard Street, Washington, D. C.	9	103	Midge Larva Pollution-Tolerant Genera	Mildly Polluted
16	Calvert Street Bridge, Washington, D. C.	10	55	Midge Larva Sludgeworms Bloodworms	Mildly Polluted
17	Upstream from P Street Outfall, Washington, D. C.	6	158	Intermediate Midge Sludgeworms	Mildly Polluted
18	Downstream from P Street Outfall, Washington, D. C.	5	Not Taken	Bloodworms Sludgeworms Leeches	Moderately Polluted
19	Slash Run Outfall, Washington, D. C.	5	480	Intermediate Midge Sludgeworms	Moderately Polluted
20	Mouth of Rock Creek, Washington, D. C.	1	Not Taken	Bloodworm	Moderate to Heavy Pollution



BIOLOGICAL SURVEY
POTOMAC RIVER BASIN

ROCK CREEK & TRIBUTARIES (AVERY, MD. - CONFLUENCE W POTOMAC RIVER)

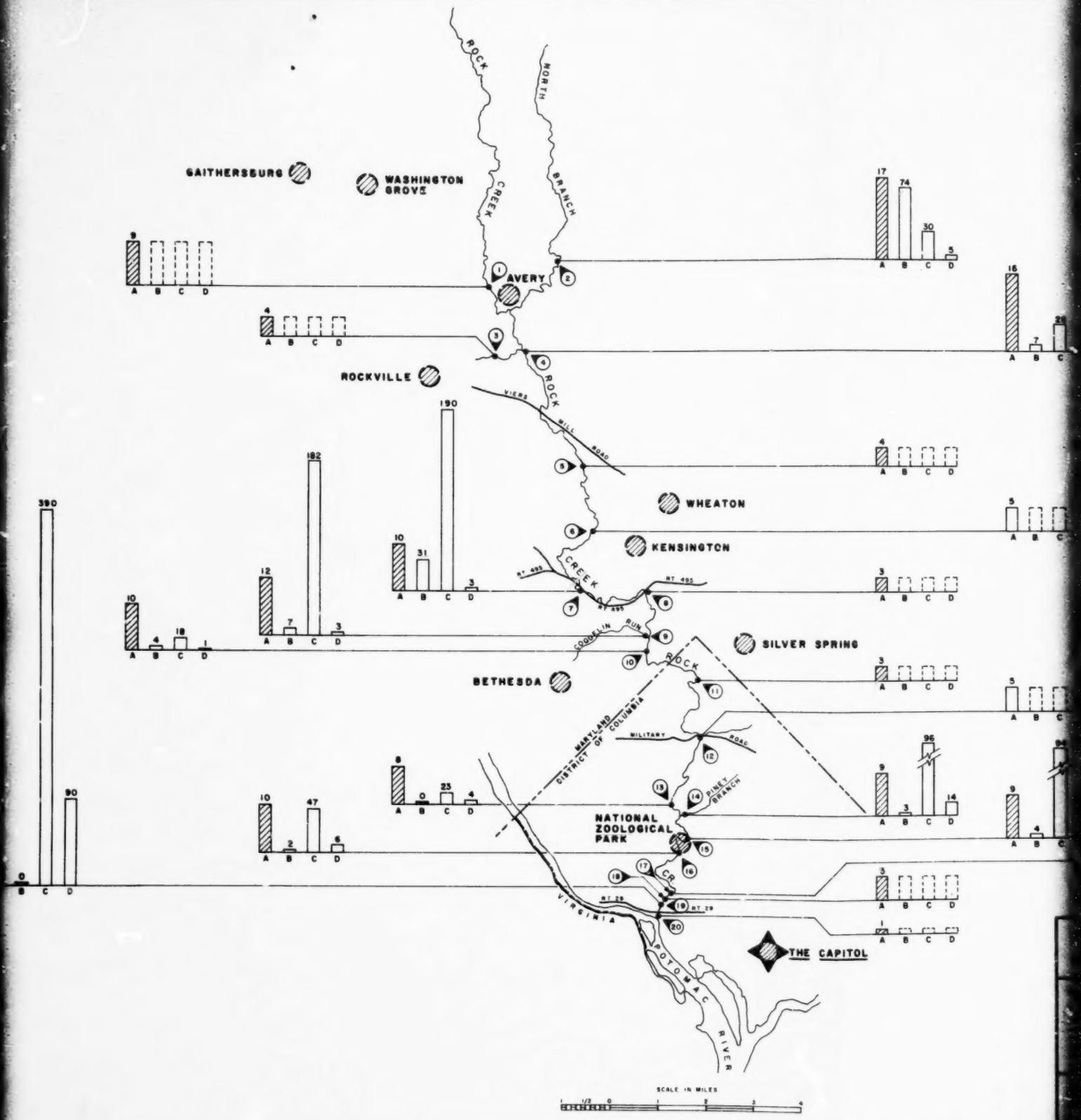
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTR
MIDDLE ATLANTIC REGION CHARLOTTESVIL

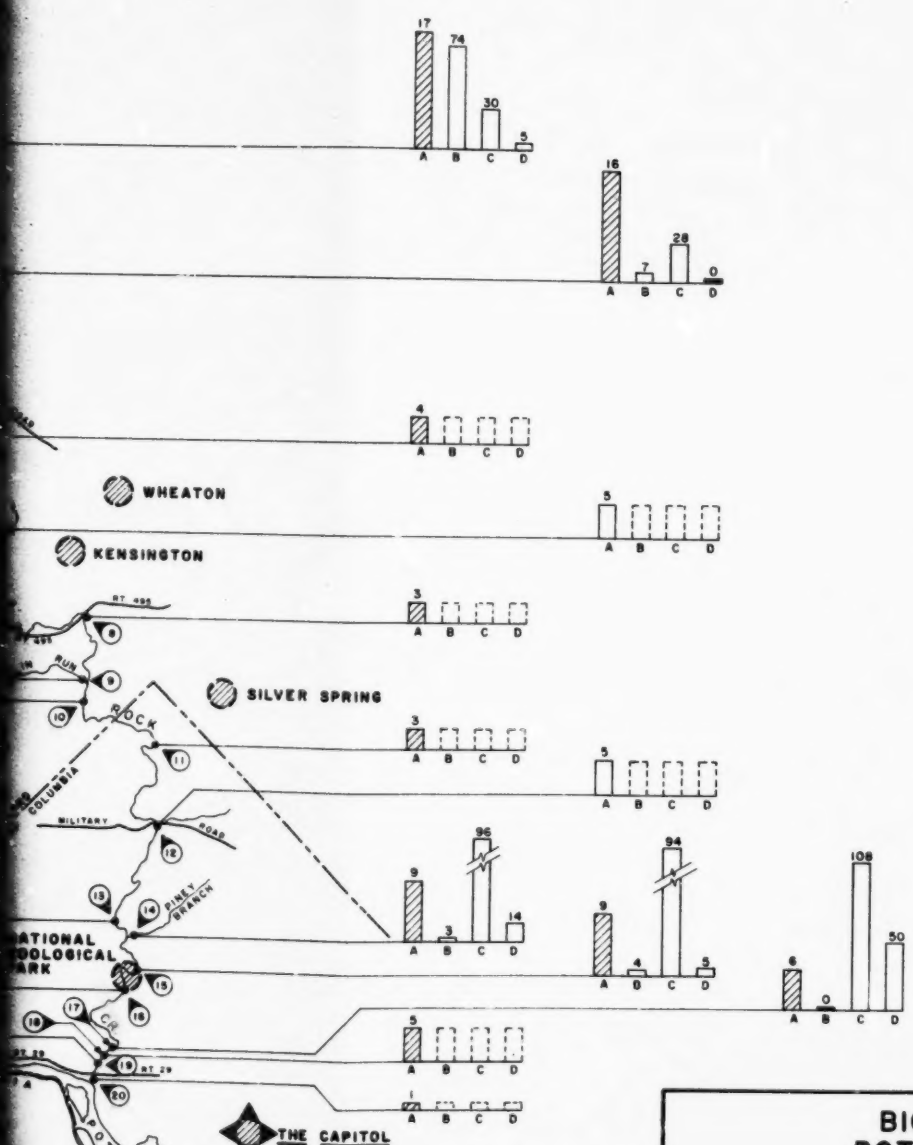


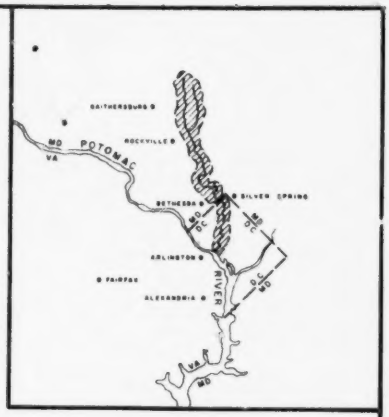
BIOLOGICAL SURVEY
POTOMAC RIVER BASIN

ROCK CREEK & TRIBUTARIES (AVERY, MD. - CONFLUENCE WITH POTOMAC RIVER)

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.


ROCK CREEK
NORTH BRANCH
GAITHERSBURG
WASHINGTON GROVE
AVERY
ROCKVILLE
ROCK
VIERS MILL ROAD
WHEATON
KENSINGTON
CREEK
RT 495
SOUDELLIN RUN
SILVER SPRING
BETHESDA
ROCK
MARYLAND
DISTRICT OF COLUMBIA
MILITARY ROAD
PINEY BRANCH
NATIONAL ZOOLOGICAL PARK
CR
RT 29
VIRGINIA
POTOMAC RIVER
THE CAPITOL
SCALE IN MILES





LOCATION MAP

N

LEGEND:

- STATION NUMBER
- 5 — B, C, or D — QUANTITATIVE SAMPLE TAKEN AND NO OF ORGANISMS FOUND PER SQ FT
- B, C, or D — QUANTITATIVE SAMPLE NOT TAKEN
- 25 — A — QUALITATIVE SAMPLE TAKEN AND No OF KINDS (GENERA) OF ORGANISMS FOUND

BOTTOM ORGANISMS

- A — TOTAL No OF KINDS, INCLUDING TYPES B, C, & D
- B — CLEAN WATER ORGANISMS FOUND IN SQ FT SAMPLE
- C — INTERMEDIATE ORGANISMS FOUND IN SQ FT SAMPLE
- D — POLLUTION TOLERANT ORGANISMS FOUND IN SQ FT SAMPLE

BIOLOGICAL SURVEY
POTOMAC RIVER BASIN

ROCK CREEK & TRIBUTARIES (AVERY, MD. - CONFLUENCE WITH POTOMAC RIVER)

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FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.